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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,428	03/12/2004	Michael T. Rowan	68865.001007	8147
21967 7590 07/21/2009 HUNTON & WILLIAMS LLP INTELLECTUAL PROPERTY DEPARTMENT 1900 K STREET, N.W. SUITE 1200 WASHINGTON, DC 20006-1109				
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GU, SHAWN X				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/799,428

**Applicant(s)**

ROWAN ET AL.

**Examiner**

SHAWN X. GU

**Art Unit**

2189

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 26-44, 46, 48-50, 52, 54 and 55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26, 28, 31-33, 35 and 37-43 is/are rejected.
- 7) ☒ Claim(s) 27, 29, 30, 34, 36, 44, 46, 48-50, 52, 54 and 55 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 7/8/2009.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This Office action is in response to the amendment filed on 15 May 2009 and the Request for Continued Examination on 17 June 2009. Claims 26-44, 46, 48-50, 52, 54 and 55 are pending. Claims 1-25, 45, 47, 51 and 53 are cancelled. All objections and rejections not repeated below are withdrawn.

#### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on 8 July 2009 is in compliance with the provisions of 37 CFR 1.97. For items 2, 3, 5 and 6, Applicant explicitly pointed out in the IDS that the respective year of publication for each of the above items is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue (see Supplemental Information Disclosure Statement filed 8 July 2009, page 3, lines 1-7). Accordingly, the information disclosure statement is being considered by the examiner.

#### ***Specification***

3. The Applicant is reminded that any change in the status of the parent application 10/668,833 needs to be updated in paragraph [0001] of the instant application's specification. The patent number should be included once an issue number is assigned.

#### ***Claim Objections***

4. Claims 44, 46, 48-50, 52, 54 and 55 are objected to because of the following informalities:

Per claim 44, on lines 7-8, the limitation "the request" appears to be indefinite because step (a) recites "data requests" and step (b) recites "requesting data". It may be more appropriate to replace the limitation in question with "the request in step (b)" or "the request for data from the data store".

Per claim 44, on line 14 after "corrupted" and on line 15 after "corrupted", it would be more appropriate to insert the phrase "at the first time". In step (d), a determination is made on whether the data stored was corrupted at the first time, and without the suggested change step (e) would appear to claim an invention that determines whether or not the data store was corrupted in general. However, the written disclosure only supports an invention that determines whether or not the data store was corrupted at specific points in time.

Per claim 50, on lines 15 and 17, it would be more appropriate to insert "at the first time" after "predetermined manner". The reason for making the suggested change is similar to the reason given above for claim 44.

All dependent claims are objected to for having the same deficiencies contained in the claims they are dependent from. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. Claims 26, 28, 31-33, 35 and 37-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Wu et al. [US 6,981,114 B1] (hereinafter "Wu").

Independent Claim:

(A) Per claim 26, Wu teaches a method for identifying a time at which first data (the post-modification value of a block of data needed for reconstructing snapshot B, see col. 10, lines 12-55, note that col. 8, lines 58-67 and col. 11, lines 22-27 teach "forward reconstruction" if a later created snapshot was deleted and reconstructed from an earlier snapshot using the post-modification values from the Modification Log 260) was written to a first data store (the Mirror Volumes 240 and the Primary Volumes 220 form a synchronized mirroring/backup system, and they are both managed by the Volume Manager 210, therefore they can be viewed together as a data storage system or a data store, see Fig. 2 and col. 4, lines 40-60 for Volume Manager 210 and col. 5, lines 6-27 for synchronized mirroring), comprising the steps of:

configuring a second data store (Modification Log 260 in Backup Device 250 in Fig. 2) to respond to data requests with first data if the first data was stored in the first data store at a first time (the first time is the point in time between T1 and T2 where a block needed for reconstructing a snapshot was modified; note that T1 and T2 are the creation times of snapshots A and B and the post-modification block value should be stored at least at the time of the modification in both the Primary Volumes 220 and

Mirrored Volumes 240 if they are synchronized, or in the Primary Volumes 220 if the Mirrored Volumes 240 are disconnected) in the past (the first time is prior to the time of execution of the reconstruction process; note that according to col. 8, lines 58-67, col. 10, lines 12-55 and col. 11, lines 22-27, if a modification to a block between T1 and T2 is identified, then in a forward reconstruction process the post-modification data value for the block is retrieved from the Modification Log 260 and used for reconstructing snapshot B);

requesting second data from the second data store (the second data is the identification/determination of whether any blocks were modified between T1 and T2; see col. 10, line 38-41, "the modification logs(s) ... may identify data blocks modified between T1 and T2"; also see col. 8, lines 4-31 and col. 8, line 32 to col. 9, line 2 for detection of modification);

receiving the second data (col. 10, lines 38-41; the modification identifying information is received and used for the reconstruction process as depicted in col. 10, lines 12-55); and

determining from the second data if the first data store contained the first data at the first time (see col. 10, lines 12-55, the modification identifying information also indirectly determines that if there was no modification between T1 and T2, then the post-modification value could have never existed in the Primary Volumes 220 and/or Mirrored Volumes 240 between T1 and T2; in other words, if there was no modification for a block, then there was never any post-modification values written to the volumes at that block);

identifying a second time, different from the first time, if the first data store did not contain the first data at the first time (see col. 10, lines 12-55, in the case where there was no modification between T1 and T2 to a block in the Primary Volumes 220 and/or Mirrored Volumes 240, then there is no post-modification value for the block between T1 and T2, as a result the block value from snapshot A is used instead to reconstruct snapshot B; note that the snapshots are identified by their time of creation, and the second time is snapshot A's time of creation, see col. 6, lines 46-50 and col. 9, lines 45-46).

Dependent Claims:

(B) Per claim 28, Wu further teaches configuring the second data store to respond to data requests made to the second data store with data stored in the first data store at a third time in the past (the third time is another point in time other than the first time between T1 and T2 where a block needed for reconstructing a snapshot was modified; see col. 8, lines 4-31 and col. 8, line 32 to col. 9, line 2 for detection of modifications; note that T1 and T2 are the creation times of snapshots A and B and the post-modification block value should be stored at least at the time of the modification in both the Primary Volumes 220 and Mirrored Volumes 240 if they are synchronized, or in the Primary Volumes 220 if the Mirrored Volumes 240 are disconnected);

requesting fourth data from the second data store;

receiving the fourth data from the second data store (the fourth data is the identification/determination of whether any other blocks other than the block discussed

in claim 26 were modified between T1 and T2; see col. 10, line 38-41, "the modification logs(s) ... may identify data blocks modified between T1 and T2"; also see col. 8, lines 4-31 and col. 8, line 32 to col. 9, line 2 for detection of modification); and

determining from the fourth data if the first data store contained the first data at the third time (see col. 10, lines 12-55, the modification identifying information also indirectly determines that if there was no modification between T1 and T2, then the post-modification value could have never existed in the Primary Volumes 220 and/or Mirrored Volumes 240 between T1 and T2; in other words, if there was no modification between T1 and T2 for a block, then there was never any post modification values written to the volumes at that block).

(C) Per claim 31, Wu further teaches the second time and the third time are selected in response to at least one previously completed determining step (see col. 10, lines 12-55, the second time is the creation time of Snapshot A and the third time is the modification of a block between T1 and T2, one of these two times is selected to retrieve the necessary data value to reconstruction Snapshot B depending on a determination on whether a modification to the block occurred between T1 and T2).

(D) Per claim 32, Wu further teaches the configuring step further comprises communicating the first time to the second data store (see col. 6, lines 20-25, col. 6, line 65 to col. 7, line 25, col. 9, lines 45-61 and col. 10, lines 12-55, the time of modification for a block is communicated to and stored in the Modification Log 260).



(E) Per claim 33, Wu further teaches the configuring step further comprises communicating the first time to the second data store via a channel which is used to communicate the request for second data (see Fig. 2 for the connection between Backup Device 250 and Primary Host 200 which contains the manager software programs, note that this connection is shown to be the only channel/bus that connects the host and the Backup Device 250, and it should be clear from the figure that log data including the time of modification and modification data must be read and written through the same connection).

(F) Per claim 35, Wu further teaches the second data store is a virtual representation of the first data store at the first time (note that because all modifications are logged as disclosed in col. 6, lines 20-23, and because the Modification Log 260 logs the modification value for the modification at the first time, the Log 260 provides a representation of the volumes at the time of modification so that a snapshot can be recreated using the Log 260).

(G) Per claim 37, Wu further teaches prior to the configuring step, the step of continuously saving information stored in the first data store before it is overwritten (see col. 4, lines 61-65 and col. 6, lines 14-37 continuous copy-on-write whenever there is a modification).

(H) Per claim 38, Wu further teaches the first time is a time selected from a substantially continuous time interval between a past time and a current time (see col. 7, lines 17-25 and col. 9, lines 45-61, the time of modification is the first time, the past time is the creation time of snapshot A, and the current time is the time of reconstruction; because the snapshots and the modifications are identified by creation time, the time value itself must be selected first in order to retrieve the data needed for reconstruction).

(I) Per claim 39, Wu further teaches the second data store is configured using a user interface (note here configuration is the setting up of the modification log 260 database to a state that is ready to record and track modifications made to the Mirror Volumes 240; see col. 6, lines 14-37, the format/structure of the modification log 260 must be set up first before it can be used as a database for tracking modifications; the modification log 260 and the manager software programs in Fig. 2 must be configured/setup by a user through a user interface; also note a user can be a human user or an application or operation system that utilizes the modification log 260; also note that because the instant claim does not specify what the second data store is configured to do, any procedure that alters or controls the second data store can be interpreted to configure the second data store).

(J) Per claim 40, Wu further teaches the second data store is configured by an I/O command (note that any writing or initialization of the Backup Device 250 and the Modification Log 260 is an I/O command).

(K) Per claim 41, Wu further teaches the second data store is configured substantially immediately (note here configuration is interpreted as the recording or tracking by the Modification Log 260 of the modifications made to the Mirrored Volumes 240, the recording is done with a copy-on-write procedure, see the rejection of claim 37 set forth above; also note that because the instant claim does not specify what the second data store is configured to do, any procedure that alters or controls the second data store can be interpreted to configure the second data store).

(L) Per claim 42, Wu further teaches the second data store is configured substantially immediately relative to at least one time at which the first data was written to the first data store (note here configuration is interpreted as the recording or tracking by the Modification Log 260 of the modifications made to the Mirrored Volumes 240, the recording is done with a copy-on-write procedure, see the rejection of claims 37 and 41 set forth above; because the pre-modification value at the first time is similar logged in a copy-on-write process when the modification occurred, the configuration of the Modification Log 260 to store the pre-modification value is done substantially immediately relative to the time of modification; also note that because the instant claim does not specify what the second data store is configured to do, any procedure that

alters or controls the second data store can be interpreted to configure the second data store).

(M) Per claim 43, Wu further teaches the second data store is configured without copying data from the first data store to the second data store (note here configuration is the setting up of the modification log 260 database to a state that is ready to record and track modifications made to the Mirror Volumes 240; see col. 6, lines 14-37, the format/structure of the modification log 260 must be set up first before it can be used as a database for tracking modifications; also note that because the instant claim does not specify what the second data store is configured to do, any procedure that alters or controls the second data store can be interpreted to configure the second data store).

***Allowable Subject Matter***

7. Claims 27, 29, 30, 34 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 44, 46, 48-50, 52, 54 and 55 are allowed over prior art.

The following is the reason for indicating allowable subject matter:

Per claim 27, Wu's second time is the creation time of snapshot A, and the first data is the modification value for a block at a time between T1 and T2, Wu's first data is

never stored in the its first data store (Primary Volumes 220 and Mirrored Volumes 240) at its second time.

Per claim 29, Wu's first data is post-modification value used for reconstructing a snapshot, it's not intended to be corrupted data.

Per claim 30, Wu's Backup Device 250 is not on the same logical device as the Primary Volumes 220 and Mirrored Volumes 240.

Per claim 34, there is only one connection between Host 200 and Backup Device 250 in Wu.

Per claim 36, Wu's first data is the post-modification value and its second data is the modification identifying information. Wu does not teach comparing these two data values.

Per claim 44, for steps (a) to (d), Wu teaches each step by disclosing a data store formed by Volumes 240 and the Modification Log 260 in Backup Device 250, from where pre or post-modification values are retrieved to fulfill snapshot reconstruction request. The Mirrored Volumes 240 and the Modification Log 260 receives requests for data during the reconstruction process and subsequently provides the data in response to the requests. The managing software programs in Wu must determine whether there had been modifications at particular points in time during a reconstruction process, in order to decide whether a preexisting snapshot should be modified with the pre or post modification values stored in the Modification Log 260. For step (e), Wu substitutes a second time for the first time, with the second time being another point in time for which a determination is made on whether there had been a modification. However, Wu does

not teach that the second time is earlier than the first time if it was determined that the data store was corrupted, and the second time is later than the first time if it was determined that the data store was not corrupted. Instead, Wu detects modification by sequentially tracing through the Modification Log 260.

Per claim 50, for steps (a) to (d), Wu teaches each step by disclosing a data store formed by Volumes 240 and the Modification Log 260 in Backup Device 250, from where pre or post-modification values are retrieved to fulfill snapshot reconstruction request. The Mirrored Volumes 240 and the Modification Log 260 receives requests for data during the reconstruction process and subsequently provides the data in response to the requests. The managing software programs in Wu must determine whether there had been modifications at particular points in time during a reconstruction process, in order to decide whether a preexisting snapshot should be modified with the pre or post modification values stored in the Modification Log 260. For step (e), Wu substitutes a second time for the first time, with the second time being another point in time for which a determination is made on whether there had been a modification. However, Wu does not teach that the second time is earlier than the first time if it was determined that the data store was modified in a predetermined manner, and the second time is later than the first time if it was determined that the data store was not modified in the predetermined manner. Instead, Wu detects modification by sequentially tracing through the Modification Log 260.

***Response to Arguments***

8. Applicant's remarks with respect to claims 26, 28, 31-33, 35 and 37-43 have been considered but are moot in view of the new ground(s) of rejection. Note that the Applicant's amendment to claim 26 altered the scope of the claim and this Examiner's interpretation of the claimed invention, thereby necessitating the new rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shawn Gu whose telephone number is (571) 272-0703. The examiner can normally be reached on 9am-5pm, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reginald Bragdon can be reached on (571) 272-4204. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/SHAWN GU/

Shawn X Gu  
Patent Examiner  
Art Unit 2189

17 July 2009